



Energy

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The California  
ENERGY COMMISSION

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## California's Oil Refineries

California's refineries are located in the San Francisco Bay area, Los Angeles area and the Central Valley. Each day approximately two million barrels (a barrel is equal to 42 U.S. gallons) of petroleum are processed into a variety of products, with gasoline representing about half of the total product volume. (A list of refineries, their location and capacity is shown in the table below.)

Refineries can be classified as topping, hydroskimming or complex. Topping refineries are the least sophisticated and contain only the atmospheric distillation tower and possibly a vacuum distillation tower. The topping refiner's ability to produce finished products depends on the quality of the petroleum being processed. A hydroskimming refinery has reforming and desulfurization process units in addition to basic topping units. This allows the refiner to increase the octane levels of motor gasoline and reduce the sulfur content of diesel fuel. Complex refineries are the most sophisticated refinery type and have additional process units to "crack" the heavy gas oils and distillate oils into lighter, more valuable products.

Using a variety of processes including distillation, reforming, hydrocracking, catalytic cracking, coking, alkylation and blending, the refinery produces many different products. The four basic groups are motor gasolines, aviation fuel, distillate fuel and residual fuel. On a statewide average, about 12 percent of the product from California's refineries is aviation fuel, 13 percent is distillate fuel and 9 percent is residual fuel.

Complex refineries have the highest utilization rate at approximately 95 percent. Utilization rate is the ratio of barrels input to the refinery to the operating capacity of the refinery. Complex refineries are able to produce a greater proportion of light products, such as gasoline, and operate near capacity because of California's large demand for gasoline. Permitting Issues. It is unlikely that new refineries will be built in California. In fact, from 1985 to 1995, 10 California refineries closed, resulting in a 20 percent reduction in refining capacity. Further refinery closures are expected for small refineries with capacities of less than 50,000 barrels per day. The cost of complying with environmental regulations and low product prices will continue to make it difficult to continue operating older, less efficient refineries.

To comply with federal and state regulations, California refiners invested approximately \$5.8 billion to upgrade their facilities to produce cleaner fuels, including reformulated gasoline and low-sulfur diesel fuel. These upgrades received permits since low-sulfur diesel fuel regulations went into effect in 1993. Requirements to produce federal reformulated gasoline took effect at the beginning of 1995, and more stringent state requirements for CARB reformulated gasoline went into effect statewide on April 1, 1996. That requirement was removed by Governor Gray Davis when it was found that the oxygenate, methyl tertiary butyl-ether or MTBE, was leaking from some underground storage tanks and polluting water supplies. MTBE was phased out and removed as of December 31, 2003, and replaced by ethanol.

For information about oil production and imports to refineries, please see our [main oil page](#).

### Refineries Outside of California That Can Produce California Gasoline

Domestic sources include refineries located in Washington State and the US Gulf Coast. Foreign sources include Eastern Canada, Finland, Germany, US Virgin Islands, Middle East, and Asia.

## California Oil Refinery Locations and Capacities

Classification of refiners based on crude oil capacity (barrels per day)

Information as of October 2012

Refinery Name	Barrels Per Day	CARB Diesel	CARB Gasoline
BP West Coast Products LLC, Carson Refinery	240,000	Yes	Yes
Chevron U.S.A. Inc., El Segundo Refinery	276,000	Yes	Yes
Chevron U.S.A. Inc., Richmond Refinery	245,271	Yes	Yes
Tesoro Refining & Marketing Company, Golden Eagle Martinez/Avon Refinery	166,000	Yes	Yes
Shell Oil Products US, Martinez Refinery	156,400	Yes	Yes
ExxonMobil Refining & Supply Company, Torrance Refinery	149,500	Yes	Yes
Valero Benicia Refinery	132,000	Yes	Yes
ConocoPhillips, Wilmington Refinery	139,000	Yes	Yes
Tesoro Refining & Marketing Company, Wilmington Refinery	103,800	Yes	Yes
Valero Wilmington Refinery	78,000	Yes	Yes
ConocoPhillips, Rodeo San Francisco Refinery	78,400	Yes	Yes
ALON USA, Bakersfield Refinery	66,000	Yes	Yes
Paramount Petroleum Corporation, Paramount Refinery	50,000	No	Yes
ConocoPhillips, Santa Maria Refinery	41,800	No	No
Edgington Oil Company, Long Beach Refinery	26,000	No	No
Kern Oil & Refining Company, Bakersfield Refinery	26,000	Yes	Yes
San Joaquin Refining Company Inc., Bakersfield Refinery	15,000	Yes	No
Greka Energy, Santa Maria Refinery	9,500	No	No
Lunday Thagard, South Gate Refinery	8,500	No	No
Valero Wilmington Asphalt Refinery	6,300	No	No
Note: Data on this table represents total crude oil capacity not gasoline, distillate production, diesel fuel production or production of other products. Production potential varies depending on time of year and status of the refinery. A rule of thumb is that <u>roughly</u> 50 percent of total capacity is gasoline production (about 1.0 million barrels of gasoline - 42 million gallons - is produced per day).			
Source: California Energy Commission Fuels Office Staff.			

### Terminal Facilities

California's nearly 100 terminals receive petroleum and petroleum products by tanker, barge, pipeline, rail or truck. Most of California's terminals are marine terminals. At these facilities petroleum or product is transferred from or to tankers or barges. Tankers loaded with Alaska North Slope petroleum, for example, enter marine terminals in northern and southern California, where the crude oil is then sent to refineries by pipeline for processing. An example of pipeline receipts of petroleum at a terminal is heavy California petroleum produced in the Bakersfield area that is sent by pipeline to a refinery at Martinez.

Terminals also serve as refiner's wholesale distribution points for products. Product, such as gasoline, is sold to distributors (jobbers) who then sell to consumers through the distributors' own retail stations. The distributor may also resell the gasoline to other station dealers. Gasoline can also be sold directly to station dealers from the terminal. The marketing structure differs depending on the type of product being sold.

A terminal can be linked with several refineries and storage facilities and be supplied by privately-owned pipelines or a common carrier line. Total capacity at a terminal can range from a few thousand barrels to a few million barrels. The most apparent equipment at a terminal are the tanks used for storage and separation of different product grades. The number of tanks can range from a few to more than 70. Other equipment found includes piping, pumps, valves, and meters needed for bulk receipts and for loading racks used for small deliveries to trucks. Marine terminals have vessel length and water depth limits that dictate the size of tankers that can off-load at the facility.

**Permitting Issues.** Some of the environmental and safety issues associated with permitting petroleum and petroleum product terminals include:

- Changes in visual quality
- Disturbances to vegetation and wildlife
- Emissions from floating roof tanks
- Potential water and soil contamination from earthquake-damaged tanks
- Increased tanker traffic and potential for spills at marine facilities

## References

1. **U.S. Petroleum Refining, Meeting Requirements for Cleaner Fuels and Refineries**, Volume I, National Petroleum Council, August, 1993. This document is a comprehensive assessment of how environmental regulations impact the petroleum refining industry and U.S. consumers.
2. **Fuels Report**, California Energy Commission, December, 1995, Publication No. P300-95-017. The Fuels Report describes emerging trends and long range forecasts of the demand, supply and price of petroleum, petroleum products, natural gas, coal and synthetic and other fuels. It is the state's principal fuels policy document.
3. Petroleum Industry Information Reporting Act submittals from the petroleum industry to the California Energy Commission.
4. **Quarterly Oil Report**, Fourth Quarter 1993, April 1994, California Energy Commission, Publication No. P300-94-003. This report describes petroleum fuels market trends, price trends, refinery activity, oil production trends and petroleum company financial performance. It contains aggregated petroleum statistics for California based on industry submittals to the Commission including refinery utilization rates.
5. **1994 Annual Report**, Western States Petroleum Association.

## Sources:

Refinery list - California Energy Commission staff, updated regularly.

Background information and discussion - *Energy Aware Planning Guide II: Energy Facilities*, California Energy Commission, Publication No. 700-96-006, December 1996, Appendices B-24 and B-25.in